Fall 2019

Division of Natural Sciences Fall 2019 Newsletter

Bridgewater College

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Newsletter

NATURAL SCIENCES

Biology and Environmental Science
Chemistry
Mathematics and Computer Science
Physics
Psychology

New Programs in Psychology and Data Science

Two new programs in the division will start in the fall of 2020, pending final approval by SACSCOC, the accrediting body of the College.

The master of science in psychology—mental health professions (MSPsy) is intended for students who have earned a bachelor's degree and wish to spend one additional academic year developing skills and obtaining experience that will enhance their prospects for careers in mental health professions. Students who complete the degree will be able to immediately apply for the Qualified Mental Health Professional (QMHP) designation from the Virginia Board of Counseling. Areas such as brain injury, dementia and memory, and criminal justice can be the student's primary focus for their program experience. One of the strengths of the program is that the curriculum will be shared by faculty in the Department of Psychology and the Department of Sociology, providing interdisciplinary depth to the student experience.

The second new program provides opportunities for students in the evolving field of data science. The new data science and analytics major is designed for undergraduates who wish to extend their analytical skills and develop problem-solving techniques that combine concepts in mathematics, computer science, data science and technology. The program will be especially beneficial to students looking at majors in math and computer science, but it may appeal to students who wish to apply analytical problem solving to a wide variety of issues and disciplines, including the social sciences, humanities and business. Two minors, data analytics and data administration, have also been developed to emphasize different aspects of the curriculum and could attract students interested in business or in aspects of any discipline involving statistical analysis or data administration.

In addition, the computer science program recently completed its strategic planning process and revised the computer science major into three tracks—fullstack web development, cyber security and theoretical computing—allowing students to specialize and develop their skill sets in those areas.

MESSAGE FROM THE DIVISION HEAD

Greetings, Alumni and Friends!

At the end of August, we welcomed the class of 2023 and began the new academic year. Returning students, faculty and staff all engaged in the process of renewing our community and bringing energy and enthusiasm for exploring new possibilities.

We're excited about the new programs we're launching (see story on left) that have been developed with your insight and experiences in mind. We've learned from alumni who returned to campus and talked about the ways their college experience has prepared them for rewarding careers.

The Division of Natural Sciences launched its first-ever Career Day last spring, featuring 10 alumni with majors in the division who returned to campus and spoke with current students about their career trajectories since graduating from BC. The alumni served as panelists during a question and answer session with current students, answering questions ranging from specific career advice to quality of life and life changes. Thanks to all of our panel participants: **Julia Stutzman Coronado '08**, **Jill Dellinger Early '87**, **Greg Gum '89**, **Robert Ham '05**, **Brian Jackson '97**, **Elizabeth Martens '07**, **Ann Cheshire Ridder '87**, **Brian Thomas '12**, **JP Utz '17**, and **Tyler Weisman '15**.

We hope to see you back on campus soon.

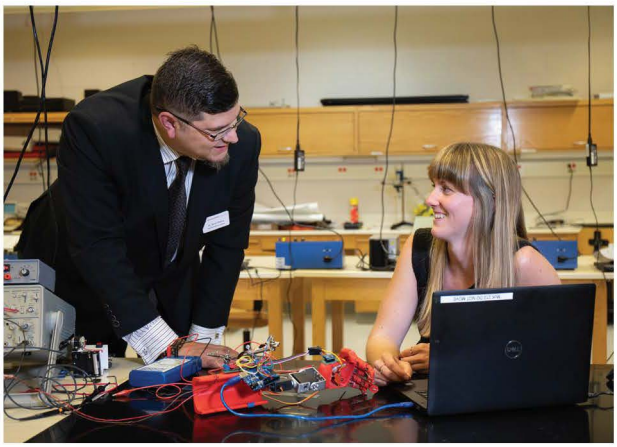
Best wishes,
Phil

Dr. Phil Spickler
pspickle@bridgewater.edu

The Future of 3-D Prosthetics

Rachel Zarin '20, a senior double major in applied physics and health and exercise science from Woodstown, N.J., envisions a future in which prosthetic limbs can be created with a few clicks of a button—and for a fraction of the cost of most prosthetics. Her innovative idea, which is at the center of her Dr. John Martin Summer Science Research Institute project with Assistant Professor of Physics **Dr. Jason E. Ybarra**, reduces the cost of a prosthetic arm from upwards of $30,000 to $100. Customers would be able to purchase motors, sensors and other parts needed online, as well as create pieces for their prosthetic using a 3-D printer.

"There are millions of amputees who would benefit from prosthetics but most people can't afford them," said Zarin.



Zarin has been interested in building things from a young age, when Legos were still her medium of choice. As a student at Bridgewater, Zarin took her interests even further when she took advantage of the College's intensive May Term courses her sophomore year and constructed an arm model as her final project in a 3-D printing. After identifying her goal of attending graduate school for biomedical engineering, Zarin approached Ybarra about adding a physics major to her course load. The synergistic nature of the computer science courses within the physics major curriculum added to Zarin's skill set, which she was able to expand upon even further with her summer research project.

After seeing different projects based on 3-D printed prosthetics, Zarin wanted to combine her interests in health and engineering to make her own version. The project would also give her real-world research experience that is critical in her chosen field. She credits the close student/faculty relationships at Bridgewater as well as the readily available research opportunities for students—especially those intending to combine different fields of interest—with helping bring her project to fruition. The main goal of Zarin's project, "Improving Low Cost 3-D Printed Prosthetics with Sensors," was to create a prosthetic hand that could grip a cup and bring it to a person's mouth while keeping the cup level. "Creating my own design was really cool, as was integrating all the different aspects of programming, electronics and 3-D printing," Zarin said.

Ybarra, an astrophysicist by training, said working with Zarin on a project like this, one outside of his wheelhouse, defines the Bridgewater experience for both faculty and students. He learned alongside Zarin as he helped her solve problems and understand the physics behind the results. Zarin said the trial-and-error nature of the project has prepared her well for future research and jobs.

"There's so much that we can teach in the classroom, but research and development is mostly troubleshooting and seeing if things work," Ybarra said. "In the lab in class things go well, but when you do a project like this you're going to have obstacles. Students have to be troubleshooters, and I think this is a great part of that experience."

In seven weeks, Zarin built a prosthetic hand that responds to its environment. Although the hand's movements are jerkier and slower than she would like and could be adjusted with further research, Zarin said she is happy with the project outcome and hopes to present her findings at a conference this year.

Ybarra said Zarin's project is a proof of concept that other scientists could look to for their own projects, with the goal of creating improved prosthetics that enhance a user's quality of life.

MATH CENTER OPENS

Dr. Jeffrey Isaacs and **Prof. Vickie Denlinger** have been appointed co-directors of the Bridgewater College Math Center. The Math Center was piloted during the spring 2019 semester and began in the McKinney Center for Science and Mathematics. During this soft rollout, resources in the Center were made available to students enrolled in introductory math courses. More than 50 students visited the Center at least once, and many made multiple visits to the Math Center.

The co-directors are currently working on instructional and other electronic materials that will be available to students who ask for assistance with mathematical concepts or problems. The Math Center will be fully operational during 2019-20, staffed by the co-directors and their team of student tutors, as well as several other mathematics faculty.

Summer Research Awards

2019 MARTIN RESEARCH AWARDS

The Dr. John W. Martin Summer Science Research Institute is funded by an endowment generated by alumni and friends of the College to honor the achievements and service of Dr. John W. Martin. The research institute provides funding to give students access to research opportunities and professional experiences in the natural sciences.

Melissa Lempicki
Major: Biology
Advisor: Stephen Baron
"Use of a Gene Library of *Streptomyces* sp. SFB5A to Restore Phenotypic Characteristics of a Bald Mutant" (Lempicki and Baron were also funded by the VFIC 2019 Undergraduate Science Research Fellowship.)

Sarah McIntyre
Major: Biology
Advisor: Moshe Khurgel
"A comparative study of regeneration blastema *in vitro* and *in vivo*"

Rachel Zarin
Major: Physics
Advisor: Jason Ybarra
"Improving Low Cost 3-D Printed Prosthetics with Sensors"

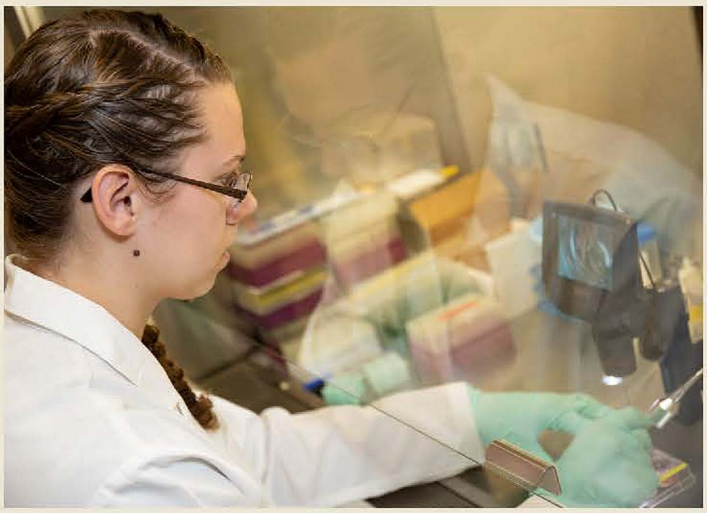
Lauren Buckhout works with children to make a scarecrow in the garden.

2019 THE RESEARCH EXPERIENCE @ BRIDGEWATER (TREB) AWARDS

The Research Experience @ Bridgewater is a donor-funded initiative providing support for teams of BC faculty and undergraduate students to spend the summer in collaborative research and creative, scholarly work in any discipline. Projects involving natural sciences majors included:

Lauren Buckhout
Major: Environmental Science
Advisor: Timothy Kreps
"Addressing Food Insecurity in Rockingham County with an Organic Garden and Complementary Education Program"

Patrick David Sly
Major: Computer Science
Advisor: Eric McGregor
"Using D3.js, an Online Textbook"



Sarah McIntyre

Melissa Lempicki

FACULTY NEWS

Dr. Robert Silverman joined the Department of Mathematics and Computer Science as Associate Professor of Computer Science in fall 2019. He earned a B.E. from City University of New York in computer engineering and an M.E. and Ph.D. in computer engineering from Purdue University. Silverman has extensive industry experience and has taught courses at all levels of computer science, including courses in security and cryptography.

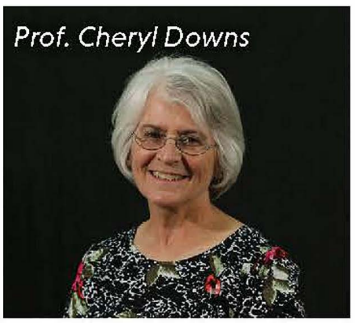
Dr. Curtis Bradley joined the Department of Psychology as a Visiting Assistant Professor of Psychology in fall 2018 and was awarded a tenure track position in fall 2019. He graduated with his B.S. in psychology from BC in 2009 and went on to earn an M.A. in psychological science from JMU and a Ph.D. in experimental psychology at East Tennessee State University.

Prof. Cheryl Downs, Instructor of Mathematics, retired at the end of the 2018-2019 academic year. She joined the College in fall 2015 after many years teaching at community colleges in Wisconsin and Virginia. She plans to live in Wisconsin and looks forward to spending time with her grandchildren.

Prof. Andrea Williams joined the Department of Mathematics and Computer Science as an Instructor of Mathematics in fall 2019. Prof. Williams is a BC graduate from the class of 2006 and earned an M.S. in mathematics from the University of Virginia. Her most recent position was Assistant Professor of Mathematics at Eastern West Virginia Community and Technical College in Moorefield, W.Va.


Dr. Robert Silverman


Dr. Curtis Bradley


Prof. Cheryl Downs


Prof. Andrea Williams

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